Amendment
Serial No. 10/506,980
Attorney Docket No. 062221

AMENDMENTS TO THE CLAIMS

The following listing of claims replaces all prior versions of claims in the application.

1-20. (Canceled)

21. (Currently Amended) An apparatus to assist a patient's respiration by delivering air to [[a]] said patient through a mask, said mask being designed to be connected on [[the]] a first extremity of a tube, said apparatus comprising:

a control unit to adjust the pressure delivered by a blower of said apparatus,

a first pressure sensor for ~~sensing~~ measuring a first pressure ~~PM at said first tube extremity and~~, said first pressure sensor being connected to said control unit, and

a second pressure sensor for ~~sensing~~ measuring a second pressure [[PB]] at [[the]] an air output of said blower, [[and]] said second pressure sensor being connected to said control unit;

wherein when a tube is connected between said apparatus and a calibrating shell with a traversing hole having a known airflow resistance coefficient K_S, the air flows from the apparatus to said calibrating shell, and the measured pressures are sent to said control unit, which calculates a tube airflow resistance coefficient K_T based on said first and second measured pressures and said known airflow resistance coefficient K_S,

~~such that,~~ wherein when a tube is connected to said mask and connected to said apparatus on ~~its said~~ a second extremity of said tube, the air ~~flowing~~ flows from the apparatus to the mask, and said control unit ~~is able to calculate~~ calculates the airflow at said second extremity of the

tube ~~from~~ based on said first and second pressures ~~PM and PB~~ and ~~from an~~ said airflow resistance coefficient K_T of said tube~~;~~

~~wherein when a tube is connected between said apparatus and a shell with a traversing hole having a known airflow resistance coefficient K_S, the air flowing from the apparatus to said shell, the measured pressures PM and PB are sent to said control unit which calculates the tube airflow resistance coefficient K_T from these measured pressures and from the said coefficient K_S~~.

22. (Currently Amended) The apparatus according to claim 21, wherein the control unit comprises an offset compensation means for compensating [[the]] a possible difference of gauging between the two pressure sensors.

23. (Currently Amended) An apparatus to assist a patient's respiration by delivering air to [[a]] said patient through a mask, said mask being designed to be connected on ~~one~~ a first extremity of a tube, said apparatus comprising:

a control unit to adjust the pressure delivered by a blower of said apparatus,

a first pressure sensor for ~~sensing~~ measuring a first pressure ~~PM at said first tube extremity and~~, said first pressure sensor being connected to said control unit, and

a second pressure sensor for ~~sensing~~ measuring a second pressure [[PB]] at the air output of said blower, [[and]] said second pressure sensor being connected to said control unit;

~~such that,~~ wherein when [[a]] said tube is connected to said mask and connected to said apparatus on ~~its said~~ a second extremity of said tube, the air ~~flowing~~ flows from the apparatus to

the mask, and said control unit ~~is able to calculate~~ calculates the airflow at said second extremity of the tube ~~from~~ based on said first and second pressures ~~PM and PB~~ and ~~from~~ an airflow resistance coefficient K_T of said tube; and

wherein the control unit comprises an offset compensation means for compensating the possible difference of gauging between the two pressure sensors.

24. (Currently Amended) The apparatus according to claim 23, wherein when [[a]] said tube is connected between said apparatus and a calibrating shell with a traversing hole having a known airflow resistance coefficient K_S, the air ~~flowing~~ flows from the apparatus to said calibrating shell, the measured first and second pressures ~~PM and PB~~ are sent to said control unit, which calculates the tube airflow resistance coefficient K_T ~~from these~~ based on said measured first and second pressures and ~~from the~~ said known airflow resistance coefficient K_S.

25. (Currently Amended) [[An]] The apparatus according to claim 23, wherein said offset compensation means ~~comprise~~ comprises:

a microprocessor,

a digital to analog converter connected to said microprocessor in order to convert said microprocessor's digital data to analog data,

an analog subtractor having inputs connected to the second pressure sensor, ~~to the~~ said first pressure sensor, and [[to]] said digital analog converter,

<u>wherein when the blower is not functioning,</u> said microprocessor <u>calculates</u> ~~calculating, when the blower is not functioning,~~ the difference between the [[two]] <u>first and second</u> pressures measured by said first and second pressure sensors <u>to obtain a value C,</u> and then ~~sending~~ <u>sends</u> the value C of ~~this~~ <u>said</u> difference to said digital to analog converter, which converts said value C to analog data and drives [[it]] <u>said value C</u> to said analog subtractor,

<u>wherein said subtractor</u> ~~which~~ subtracts the <u>second</u> pressure [[PB]] measured by said second pressure sensor and said value C [[to]] <u>from</u> the <u>first</u> pressure [[PM]] measured by said ~~second~~ <u>first</u> pressure sensor and sends the corresponding result D to the microprocessor,

<u>wherein said microprocessor</u> ~~which will modify~~ <u>modifies</u> the C value until said [[D]] result <u>D</u> equals zero, said microprocessor capturing the C value when said [[D]] result <u>D</u> equals zero, enabling the control unit to correct the difference of offsets between the pressure sensors.

26. (Currently Amended) [[An]] <u>The</u> apparatus according to claim 25, further comprising an analog amplifier connected to said analog subtractor in order to amplify the signal corresponding to said [[D]] result <u>D</u> and to send [[it]] <u>said result D</u> to said microprocessor, thus enabling said microprocessor to have an accurate adjustment of said value C until said result D reaches the value zero.

27. (Currently Amended) [[An]] <u>The</u> apparatus according to claim 26, further comprising analog to digital converters connected between the microprocessor and [[the]] said first pressure sensor, between the microprocessor and [[the]] said second pressure sensor, and between the

microprocessor and [[the]] said analog amplifier, so that the microprocessor is provided with only digital data.

28. (Currently Amended) The apparatus according to claim 23, wherein when at least one filter is placed at ~~one tube's~~ said first or second extremity of said tube, and wherein said control unit ~~is able to calculate~~ calculates the airflow at said second extremity of the tube ~~from these~~ based on said measured first and second pressures ~~PM and PB and from~~, the airflow resistance coefficient K_T of said tube, and ~~from the~~ an airflow resistance coefficient K_F of said filter.

29. (Currently Amended) [[An]] The apparatus according to claim 23, wherein said control unit comprises a nonvolatile memory in which the control unit stores~~, as a couple of values, the two pressures PM(J) and PB(J),~~ two values corresponding to said first and second pressures measured at each of said first and second pressure sensors, when said control unit forces the blower to deliver a determined constant pressure I at one of the two sensors, so that when at least two ~~couples of pressures~~ values corresponding to two different said determined constant ~~pressure~~ pressures I are stored, the control unit ~~is able to calculate~~ calculates an average of said airflow resistance coefficient K_T.

30. (Currently Amended) The apparatus according to claim 23, wherein said control unit comprises an estimation module connected to [[the]] a means for detecting the patient's breathing parameters, ~~in order~~ such that the estimation module ~~is able to determine~~ determines

when the patient is inspiring or expiring, and in response determines the pressure to apply to the patient's mask, so that the control unit adjusts the pressure delivered by the blower.

31. (Previously Presented) The apparatus according to claim 30, wherein the control unit comprises a nonvolatile memory in which a clinician can enter clinical settings comprising at least the treatment pressure and possibly the pressure to apply according to the patient's breathing parameters, said estimation module applying the pressure according to these clinical settings and to the patient's breathing parameters.

32. (Currently Amended) The apparatus according to claim 31, wherein the patient can enter patient settings in said nonvolatile memory, said ~~estimator~~ estimation module applying the pressure according to ~~these~~ said patient settings and to the patient's breathing parameters within bounds given by the clinician settings.

33. (Currently Amended) The apparatus of claim 30, in which the estimation module is able to determine that an event (E_1, E_2 or E_3) occurs in said patient's breathing, thus enabling said control unit to adjust the tension to apply to the blower to adjust the pressure at said patient's mask.

34. (Currently Amended) The apparatus of claim 30, wherein said means for detecting the patient's breathing parameters enable the control unit to compute the airflow at said patient's

mask, said ~~comparator~~ estimation module determining that an event (E_1, E_2 or E_3) is occurring with the airflow parameters or shape.

35. (Currently Amended) The apparatus according to claim 30, wherein said estimation module has an inspiration output where said estimation module [[set]] sets the [[mask]] first pressure [[PM]] value during inspiration and wherein said estimation module has an expiration output, and wherein said estimation module [[set]] sets the [[mask]] first pressure [[PM]] value during expiration, said control unit comprising a switch which is connected alternatively to the inspiration output or expiration output according to the patient's breathing.

36. (Currently Amended) The apparatus according to claim 30, wherein the apparatus further comprises a starting means which when actuated enables the estimation module to determine if a breathing activity is detected, the ~~estimator~~ estimation module sending [[the]] an instruction to stop the blower if no activity is sensed after a given delay.

37. (Currently Amended) The apparatus of claim 23, further comprising:

a Frequency Shift Keying (FSK) modulator which transforms the binary data sent by the apparatus sensors or elements in a modulation of the frequency of the tension applied on a voltage controlled current source, connected to [[the]] an external power supply, so that the voltage controlled current source ~~transmit~~ transmits the modulation corresponding to the data, and

a FSK demodulator which converts ~~converting~~ the voltage frequency modulation into binary data and ~~transmitting~~ transmits it to the elements, so that each sensor or module connected to the power source is able to receive or transmit information.

38. (Currently Amended) A kit [[Set]] for calibrating a tube used in apparatus to assist said patient's respiration comprising:

[[an]] the apparatus according to claim 23, and

a calibrating shell with a traversing hole having a known airflow resistance coefficient K_S.

39. (Currently Amended) ~~Process~~ A process for calibrating [[a]] said tube used in said apparatus to assist a patient's respiration by using the apparatus according to claim 23, said process comprising the steps of:

connecting ~~a first tube's~~ said second extremity of said tube to the blower of said apparatus,

connecting said first extremity to a calibrating shell with a traversing hole having a known airflow resistance coefficient K_S,

connecting said first pressure sensor to measure the first pressure [[PM]] at ~~a second tube's~~ said first extremity of said tube,

~~connecting said second first extremity to a shell with a traversing hole having a known airflow resistance coefficient K_S;~~

switching the blower on,

instructing said control unit to measure the first and second pressures [[on]] at said first pressure sensor and ~~on the~~ said second pressure sensor, ~~which is measuring the~~ said second pressure [[PB]] being measured at ~~the blower's apparatus~~ an outlet of said blower, and

calculating the value of the tube airflow resistance coefficient [[K_t]] K_T ~~from these~~ based on said measured first and second pressures ~~PM and PB~~ and ~~from the~~ said known airflow resistance coefficient [[K_s]] K_S.

40. (Currently Amended) ~~Process~~ A process for calibrating the tube used in apparatus to assist said patient's respiration, and for calibrating the tube by using the apparatus according to claim 23, said process comprising the steps of:

(1) connecting ~~a first tube's~~ said second extremity of said tube to the blower of said apparatus,

(2) connecting said first extremity of said tube to a calibrating shell with a traversing hole having a known airflow resistance coefficient K_S,

(3) connecting said first pressure sensor to measure the first pressure [[PM]] at ~~a second tube's~~ said first extremity of said tube,

~~connecting said second extremity to a shell with a traversing hole having a known airflow resistance coefficient~~ ~~K_S;~~

(4) switching the blower on,

(5) fixing at a value I the pressure provided and measured on one of said two pressure ~~sensor~~ sensors,

(6) instructing said control unit to measure the pressures [[on]] at said first pressure sensor and [[on]] second pressure sensor, ~~which is measuring the~~ said second pressure [[PB]] being measured at ~~the blower's apparatus~~ an outlet of said blower,

(7) storing ~~these~~ said first and second pressures ~~measures PM(J) and PB(J)~~ as a ~~couple of measures~~ measured pressure values associated [[to]] with said value I,

(8) repeating steps 5 and 6 a number of [[time]] times N ~~the steps 5 to 6 of said process~~, said value I being different for each time, so that each ~~couples of pressures is~~ of said measured pressure values are associated with one value I, and

(9) calculating on average of the airflow resistance coefficient K_T ~~from these~~ based on said first and second measured pressures ~~PM and PB~~ and ~~from the~~ said known airflow resistance coefficient K_S.